

Algebra I

Monday, October 12, 2009: Teacher work day; students off day.

Solving and Writing Inequalities

Tuesday, October 13, 2009: Holt Ch ; TEKS:

Interpreting Graphs: Bathing the Dog

MATERIALS: “dogs,” water, a container representing a tub, towels, poster size post-it notes, markers to write on the tub, markers to write on the post-its, scratch paper, rulers.

VOCABULARY: (to be extracted from the students during the activity and in the days to follow)

x-axis	horizontal	input	domain	dependent
y-axis	vertical	output	range	independent
pattern	relationship	rule	function	correlation
rate	rate of change	slope	variation	constant
increasing	positive	decreasing	negative	quadrants
continuous	discrete	intercept	intersection	solution
coordinates	ordered pair	point	origin	(x , y)

OBJECTIVE: The students will be able to: label, create, and interpret graphs from data they have participated in collecting, compare and contrast their results with the results of their classmates, then apply the knowledge gained to interpret and discern other functional relationships from/through words, data points, tables and graphs. **SW USE MULTIPLE REPRESENTATIONS FROM HERE ON OUT.**

METHOD:

The students will as a team: (Day 1 & ???)

- see what happens to the water level when they bathe their dog,
- collect related data and discuss the activity,
- plan how to represent the water level and time passed on their group graph,
- draw a graphical representation of their team’s event,
- think about why they drew the graphs they did,
- discuss the specific meaning of various points on their graphs,
- compare and contrast their methods and results with that of their classmates

The students will individually: (Later)

- write a follow-up story to Bathing the Dog called Chase the Dog
- follow the same steps with their new Chase the Dog scenario, or Crazy Containers.

The students will as a class: (Later)

- demonstrate their understanding of various graphs with the Graph Bingo Activity.

TEKS: A.1.B, C & E; A.2.C; A.5.C

TAKS: Obj. 1, 2 & 3

PREPARATION: Gather the materials; plan for water use.

A few days prior to the activity, ask the students to bring their 'dog' to class by Friday (any waterproof *sinkable* item they wish to call their dog, for example, a rock.)

5E LESSON PLANS

(See Teacher Notes)

ENGAGE: Students will bathe their dogs by following specific instructions written on their activity sheet.

EXPLORE: Students will work together to gather data, discuss the event with their group; and then describe the water level before, during, and after their dog's bath.

EXPLAIN: Students will work with their group members to explain their proceedings and results as depicted by their graph to the rest of the class. Classmates from other groups will clarify understanding and findings by asking questions of the group members. The teacher will allow free discussion and occasionally throw out a carefully considered question for thought, allowing the students to answer and debate among themselves. (See Scaffolding Questions).

ELABORATE: Students will compare and contrast their team's event, data, and graph relative to their classmates; consider what would change in their graph had their scenario been different, i.e. a tub with graduated sides, a cooperative dog, a hole in the tub, the hose on and running into the tub, etc. The teacher will again allow free discussion and occasionally throw out a carefully considered question for thought, allowing the students to answer and debate among themselves. (See Scaffolding Questions.)

Archimedes in His Bath! Elaboration Game for Bathing the Dog

EVALUATE: Posters; students notes, reflections, discussions; Graph Bingo; Chasing the Dog; CBR; Archimedes in His Bath Online Game.

TEACHER REFLECTION: What went very well? What could have been different to facilitate better understanding? Which student comments/questions showed deeper thought and/or understanding? What elicited those responses? Which student comments showed a lack of fundamental knowledge necessary to continue study? How might the student's gap(s) be filled prior to continuing the study of functions?

Scaffolding Questions: During the Bathing the Dog Activity, the students will discover relationships between variables and their expression through actions, words, tables and graphs. Consider the following questions as tools to lead the students to deeper, more critical thinking.

SCAFFOLDING QUESTIONS:

Part I Initial Questions

1. What is the water level when the tub starts to fill?
2. How will the shape of the tub affect the water level changes?
3. What happens to the water level when you put _____ into the tub?
4. What happens to the water level if _____ climbs half-way out?
5. What happens to the water level when you get _____ completely back into the tub?
6. What happens to the water level when you finish bathing _____ and she gets out?
7. How will the shape of the tub affect how the water level changes as the tub is drained?

Part II Extension Questions

1. Is it possible to write a (function) rule for this situation which will consistently describe what is happening to the water level? Why? Why not?

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2. How would the graph change if the sides of the bathtub were graduated, that is if the sides of the tub widen more from the tub bottom to the tub top?
3. When a dog enjoys getting a bath, the dog does not try to escape or thrash around. How would the graph change if _____ enjoyed getting a bath?
4. Explain the (functional) representations you used to describe Bathing the Dog.

Algebra I

Interpreting Graphs

Wednesday, October 14, 2009: PLAN District Testing for 9th graders.
Afternoon classes: Battleship graphing points on the coordinate plane
(same as morning classes last Thursday).

Algebra I

Thursday, October 15, 2009: Finish bathing the dog lesson from
Tues.

Algebra I Functions

Friday, October 16, 2009: Holt Algebra I Section 4-2;

Introduction to functions: Domain and Range; Independent and Dependent variables

Chapter 4, section 2, “Relations and Functions” (Holt, pp. 236 – 244)

TEKS: A.1.B “...gather and record data and use data sets to determine functional relationships between quantities.”

Materials:

- Graph paper
- “Domain and Range Worksheet 1_modified by SW”
- Lesson 4-2 Practice B “Relations and Functions”

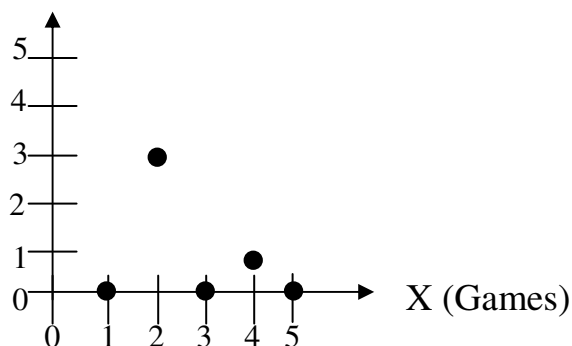
(Binder Cornell notes, Manipulatives, Graphing calculators, Holt online textbook)

Engage: Display the chart below and ask which examples could contain negative numbers and which could contain decimals.

	Negative Numbers?	Fractions and Decimals?
The value of Michael Jackson’s Neverland Ranch		
The number of interceptions thrown by Tony Romo		
Debt of the United States		
Rankings of quarterbacks in the NFL		
The water level in a swimming pool		

Explore: Introduction: “We have been looking at how to use graphs to tell a story, and today we are going to look at how we can use graphs and other methods to show all of the possible values that arise in a given situation. For instance, if I show you this graph (display the graph), and ask you to list the coordinates of each data point, what would you list?” [Answer: (1, 0), (2, 3), (3, 0), (4, 1), and (5, 0)]

Y (Interceptions)



Q: What does the first number in each ordered pair represent? (Answer: the games Romo played OR the x values). We can list each of these values inside a set of braces, and refer to the set of numbers as the Domain.

Q: What would you guess is the Range? (Answer: the second values, OR the y values OR the interceptions Tony Romo threw in each game). Let's list the Domain and Range.

D: {1, 2, 3, 4, 5}

Q: Do you think we need to list a number twice? Answer: No. R: {0, 1, 3}

Evaluate: Take the next few minutes to work problems 1 – 4 on your handout.

----- **Segment 2** -----

Q: Can you think of any ways other than graphing to list the same information on this Tony Romo graph? (Answers: tables, maps, as ordered pairs)

Take a volunteer to represent the data in table form on the board and one to represent it as a map on the board.

(Make sure they label which is X and which is Y).

Take two other volunteers to write the coordinate pairs from the Table and from the Map.

Q: What do you notice about the ordered pairs? (Answer: They're the same.) When we are finding the Domain, does it matter whether our information is listed as coordinate pairs, in a table, or in a map?

(Answer: no)

Evaluate: Take the next several minutes to work problems 5 – 8.

----- **Segment 3** -----

Elaborate (if time allows):

Now, think about the Bathing the Dog activity you did earlier this week. Suppose you wanted to develop an automatic dog wash, where dog owners could bring their dogs and place them in a tub that would automatically fill with soapy water. Q: Do you think it would be important to set a minimum and maximum water level? Why or why not?

Let's represent this situation on a graph. Draw the x and y-axes on your graph paper.

Label the x-axis "Time" and the y-axis "Water Level." Q: What do you think the units of measure would be for the x-axis? (Answer: minutes) Okay, let's put 0-10 minutes on the x-axis, and 0 – 24 inches on the y-axis.

Q: Now can anyone tell the class all of the possible lengths of time that the dog wash could fill the tub. (Allow students to discover that there are too many to list individually and that the times do not have to be whole numbers). How then could we list the possible times? (Answer from 0 to 10

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minutes) When you say “from 0 to 10 minutes” are you just talking about the times in between 0 and 10, or are you including 0 and 10 as possible values?

Spiraling (compound inequalities): Q: Can anyone list the times using one or more inequalities? (Answer: $x \geq 0$ and $x \leq 10$) We can combine these inequalities into one compound inequality by switching the 0, the x, and the inequality symbol of the first inequality and writing $0 \leq x \leq 10$
Evaluate: Try Probs. 3-10 on p. 239 of text book (display page on overhead or from my.hrw.com)

Optional Activities

- Domain and Range Powerpoint from D2SC
- Understanding Math (Understanding Graphing > Relations, Equations, and Functions)

TW walk the room and check for understanding. TW will complete binder check while students are working on independent practice.

Homework: Have a nice weekend! ☺